

Remarks/Arguments:

Claims 1 and 9 are amended. Support for each amendment can be found at page 6, lines 5, 6, 8, 11-12, and 25-26, as well as at page 7, lines 12-14 and 24 of the originally filed application. No new matter is added.

Claims 5-6, 8 and 10 are cancelled. Claims 11 and 12 are currently withdrawn from consideration. As a result, claims 1-4, 7 and 9 remain pending and under examination.

Rejections under 35 U.S.C. §103

The present invention is directed to a vacuum heat insulator with a core formed of a glass fiber laminated body and an enveloping member covering the core. Due to the claimed features, the invention provides extremely low heat conduction and high heat insulation performance.

Rejections over Fay

Claims 1-3 and 5-7 stand rejected under 35 U.S.C. §103 as obvious over Fay (US 5,609,934). It is respectfully submitted, however, that claims 1-3 and 7 are patentable over the art of record for the reasons set forth below.

Applicant's invention, as recited by claim 1, includes at least one feature that is neither disclosed nor suggested by Fay, namely, "glass fibers [that] are not cross-linked through necks formed between the glass fibers." This claimed feature makes clear that when the glass fibers are heated, necks that cross-link the fibers are not formed. Applicant has discovered that such structural feature increases the heat insulation performance of a vacuum heat insulator fabricated using a core containing the glass fibers.

The Fay reference is directed to an insulation panel comprising a binderless, heat bonded glass fiber insulation board encapsulated within a partially evacuated, gas-tight envelope. Fay teaches that such an insulation board is formed by a process wherein a thick glass fiber blanket is heated to a temperature between about 25 °C below and about 20 °C above the strain temperature of the glass fibers. This temperature is effective "to bond the discrete length glass fibers together at their points of intersection" (see column 3, line 62, through column 4, line 1). Thus, Fay teaches glass fibers that are cross-linked through necks formed between the glass fibers. Fay clearly fails to disclose or suggest a feature of

Applicant's claimed invention namely, glass fibers that are not cross-linked. Nor does Fay suggest that glass fiber cross-linking has any effect on heat conductivity, or that eliminating glass fiber cross-linking may be desirable.

Applicant has now found that using a core containing non-cross-linked glass fibers actually enhances heat insulation performance. See pg. 7, lines 12-15 of the specification. Thus, claim 1 is unobvious over Fay, as a person of ordinary skill in the art would not have had any basis for believing that eliminating cross-linking of glass fibers during manufacture of a core to be used as part of a vacuum heat insulator would result in any improvement in the insulator's performance. In fact, such a person would, if anything, have been discouraged from such a modification in view of the Fay reference's emphasis on employing process conditions which are effective "to bond the discrete length glass fibers together at their points of intersection."

Claims 2-3 and 7 include all the features of claim 1 from which they depend. Thus, claims 2-3 and 7 are also patentable over Fay for the reasons set forth above.

Claims 5-6 are cancelled. The cancellation of these claims renders the rejection moot.

Rejections over Jung

Claims 1-3, 5-7 and 9 stand rejected under 35 U.S.C. §103 as obvious over Jung (US 2002/0167105). It is respectfully submitted, however, that claims 1-3, 7 and 9 are patentable over the art of record for the reasons set forth below.

As stated above, Applicant's claim 1 includes the feature of non-cross-linked glass fibers. Jung is directed to a vacuum insulator using glass white wool. Jung, however, does not disclose Applicant's non-cross-linked glass fiber component. Neither does Jung suggest that heat conductivity is affected by cross-linking of the glass fibers, or that eliminating cross-linking glass fibers might be desirable.

Applicants have now discovered that avoiding cross-linking between glass fibers enhances heat insulation performance. See pg. 7, lines 12-15 of the specification. Claim 1 is unobvious and hence patentable over Jung, as a person of ordinary skill in the art would not have been guided by this reference to control the amount of cross-linking achieved

during heat pressing of the glass fibers and would not have had any reasonable basis for believing that the heat conductivity properties of the product obtained could be improved by the avoidance of such cross-linking.

Claims 2-3 and 7 include all the features of claim 1, from which they depend. Thus, claims 2-3 and 7 are also patentable over Jung for the reasons set forth above.

Claims 5-6 are cancelled. The cancellation of these claims renders the rejection moot.

Claim 9, while not identical to claim 1, similarly recites that "the glass fibers are not cross-linked through necks formed between the glass fibers." Claim 9 therefore is patentable for reasons similar to those set forth above with regard to claim 1.

Rejection over Fay or Jung, in view of Rapp

Claim 8 stands rejected as obvious over Fay or Jung, and further in view of Rapp (US 6,034,014). This rejection, however, is rendered moot by the cancellation of the claim.

Rejection over Fay in view of Jung

Claim 9 has been rejected under 35 U.S.C. §103 over Fay in view of Jung. Claim 9, however, is now patentable over the art of record for the reasons set forth above.

Applicant's invention, as recited in claim 9, includes at least one feature that is neither disclosed or suggested by Fay or Jung, namely, "glass fibers [that] are not cross-linked through necks formed between the glass fibers." This claimed feature makes clear that the core which forms part of the hot-insulation cold-insulation apparatus of Applicant's invention is based on non-cross-linked glass fibers (i.e., during heat processing of the glass fibers, necks that cross-link the fibers are not formed). Applicant has discovered that this structural feature increases the heat insulation performance. See page 7, lines 12-15, of the specification.

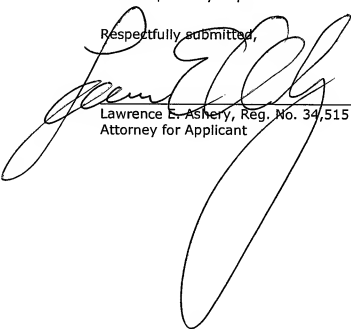
As explained previously, neither Fay nor Jung discloses the non-cross-linked character of glass fibers used in a core forming part of a vacuum heat insulator. Moreover, neither Fay nor Jung suggests that cross-linking of such glass fiber has any correlation with heat conductivity, or that eliminating cross-linking could be desirable or that any improved

result could thereby be achieved. Thus, the combined teachings of Fay and Jung do not overcome the deficiency of each, namely, neither reference teaches or suggests avoiding glass fiber cross-linking when fabricating a vacuum heat insulator to be used as a component of a hot-insulation cold-insulation apparatus.

Applicant's claim 9 recites glass fibers which are not cross-linked through necks. Accordingly, for the reasons set forth above, claim 9 is patentable over Fay in view of Jung.

In view of the amendments and arguments set forth above, the above-identified application is in condition for allowance which action is respectfully requested.

Respectfully submitted,



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